TQ Planning Considerations

LARP Collaboration Meeting 4

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Program Goals & Milestones

Proposed Goals:

A.	Short quads with ~12 T coil field	(FY06)
B.	Short quads with ~15 T coil field	(FY07)
C.	Length scale-up demonstrations	(FY07)
D.	4-m quad with ~12 T coil field	(FY09)

Objectives are interdependent:

(B) depends on success of (A)
(D) depends on success of (A) & (C)

Define program “flow chart” with milestones and decision points

1. Short Quad Models at ~12 T

1a. Should we plan on building/testing more models of the TQ1a/2a type?

- Use same conductor in both structures
- Optimize cable and coil design/fabrication
- Explore pre-stress-levels (for 4.2 and 1.9 level gradients)
- Mechanical studies, training, check FEM models, friction, strain gauges etc.

1b. Procedures for comparing and selecting between the two structures?

- Do we need to test on identical coils? (same conductor for both coils)
- What are the technical issues with exchanging coils and structures?
- Low field (TQ1a/2a) or high field (TQ1/TQ2) comparison required?
- How soon should we make that choice?

1c. Role of block-coil (racetrack) quadrupole models?

2. Short Quad Models at ~15 Tesla

2a. Should we proceed with both 3-layer and 4-layer TQs?

- What are the advantages of proceeding in parallel? Can we afford it?
- Develop the designs, then review/compare? Target dates?

2b. Continue working on 2-layer designs with wide cables?

- Several conceptual designs. Some limitations for very large apertures.
- Wide cables R&D: limits of keystone, mechanical stability, use of cores etc.
- Time scale?

3. Long Quad Models

3a. Definition of the basic parameters for the long quad:

- "Full" gradient or "reduced" gradient? Re-define based on coil field?
- How about a TQ1a/TQ2a scale-up as a baseline?

3b. Milestones and decision points:

- What results from short models and scale-up experiments are required to start working on a long quad?
- Can we formulate a baseline plan that includes a long quad in FY08?

4. Dipole Models

4a. What time scale should we expect for LARP dipole models, taking into account the various boundary conditions & contraints?

4b. Role of model magnet R&D vs. supporting R&D:

- Should the dipole PoP be part of the LARP supporting R&D or model magnet R&D working group discussions?
- Can we perform initial PoP tests using sub-scale coils? – or -
- Can this R&D be performed with existing coils in new structures? (examples: BNL common coil dipole, LBNL HD1 coils)

Magnet R&D FY05-FY09

	Length [m]	Aperture [mm]	FY05	FY06	FY07	FY08	FY09
Model Magnets							
Quads							
Reduced Gradient (costheta)		90		X X	X		
Full gradient (costheta)	1	90		X?	X	X	
Large Aperture Quad	1	~120			X	X X	X
Field quality	2						X X?
Full length, full gradient	4					X	X
Dipoles							
Open mid-plane PoP	1					X	X
Supporting R&D							
Sub-scale tests			X X	X X	X X	X X X	X X
Long coil tests					X	X	